FORE SYSTEMS ®

ForeRunner **ASN-9000**
Release Notes

Software Version

ASN_9PE_FT 4.1.x

Legal Notices

FORE Systems, Inc. makes no representations or warranties with respect to the contents or use of this manual, and specifically disclaims any express or implied warranties of merchantability or fitness for any particular purpose. Further, FORE Systems, Inc. reserves the right to revise this publication and to make changes to its content, at any time, without obligation to notify any person or entity of such revisions or changes.

TRADEMARKS

FORE Systems, and *ForeRunner* are registered trademarks of FORE Systems, Inc. *ForeThought*, *ForeView*, *CellPath*, *PowerHub*, and "All Roads Lead to ATM" are trademarks of FORE Systems, Inc. All other brand or product names are trademarks of their respective holders.

TABLE OF CONTENTS

TABLE OF CONTENTS

1.0 General Description of Software Release

These release notes highlight the features in the *ForeRunner* ASN-9000 *ForeThought* software, version 4.1.x for the *ForeRunner* ASN-9000.

2.0 Problems Fixed

The following problems in software release FT_4.0.x have been fixed in FT_4.1.x:

- If the default route of an ASN-9000 was set to itself, a host trying to use the router as a gateway got an ASN-9000 login prompt. This has been fixed so that if the default is set to itself, the ASN-9000 ARPs.

- The index parameter (lecIndex) is now saved when an elan add command is issued.

- AppleTalk zone filter is now saved in the configuration. They no longer need to be added after each reboot.

- In FT_4.0.x, the Power Cell would get hung with 16 les/bus pairs and 32 lec's configured when the fiber was pulled and then re-inserted. This problem has been corrected.

- In FT_4.0.x, SNMP failed to set alLinkStatsCollect when trying to enable statistics. This problem has been fixed.

3.0 System Requirements

Refer to the *ForeRunner ASN-9000 Hardware Reference Manual* (MANU0255-01), *ForeRunner ASN-9000 Software Reference Manual* (MANU0272-01), *ForeRunner ASN-9000 ATM Software Reference Manual* (MANU0273-01) and the *ForeRunner ASN-9000 Filters Manual* (MANU0280-01) for detailed information on the hardware requirements, software capabilities and on configuring filters for the *ForeRunner* ASN-9000*P*.

3.1 Firmware Requirements

Table 1 lists the firmware, as reported by the `ver all` command, required to take advantage of the new software and hardware features:

Table 1 - Recommended Firmware

Module	Firmware
Packet Engine 1	7pep-2.5.8 (s1.90)
PowerCell ATM Module	7atmp-1.2 (s1.7)

3.2   Memory Requirements

Table 2 lists the minimum memory requirements necessary to properly run version 4.1.x of *ForeRunner* ASN-9000 *ForeThought* software.

Table 2 - Minimum Memory Requirements

Module	Memory Required
PowerCell ATM Module	8MB

3.3   ASN-9000 Packet Engine

The ASN-9000 Packet Engine contains four processors, since the Packet Accelerator is installed as part of the standard starter kit, which share the load in processing traffic through the ASN-9000. The processors in the Packet Engine contain the bridging and routing engines that intelligently examine packet headers, modifying them as required for routing. It places the packets on the Packet Channel Backplane and transfers it directly to the shared packet-buffer memory in the Packet Engine.

The Main CPU (MCPU) examines the source and destination addresses in the packets and determines which segment(s) the packet needs to be forwarded to and the modifications, if any, that need to be made to the packet. After any necessary modifications are performed, the Input/Output Processor (IOP) queues the packet for transmission on the appropriate destination port(s).

The ASN-9000 Packet Engine is also responsible for maintaining complete routing and bridging tables. Caches of route and bridge tables are distributed to ATM Network Interface Modules which make forwarding decisions locally and use the IOPs to queue packets to the appropriate NIM. The major features of the ASN-9000 Packet Engine are:

- Utilizes four 40MHz RISC (64bit internal-32bit external) processors, with a Packet Accelerator is installed, each with specialized functions: two MCPUs and two IOPs.
- Supports a two channel backplane for a peak bandwidth of 1.6 Gbps. These high-speed channels are implemented and controlled through the incorporation of ten proprietary ASIC devices.

Supports up to 96 segments, ships with 32MB of dynamic random access memory (DRAM) plus 1MB of Descriptor memory and a 4MB Flash Memory Module for system file storage.

3.4   Chassis

The ASN-9000 is available in a 5-slot, 2-packet channel chassis configuration. The modules can be of any combination of available NIMs. Refer to the *ForeRunner* ASN-9000 *Hardware Reference Manual* for specific configuration related information.

3.4.1   PowerCell 700 ATM Module

The PowerCell 700 ATM module can support up to two OC-3 fiber or UTP ATM Media Adapters (AMAs). When two AMAs are installed, one is configured as a primary port while the other acts as a backup port in the event of a failure in the primary. This provides for redundancy on the ATM ports.

3.5   500Watt Power Module

A 500Watt Power Module supports the NIMs installed in the ASN-9000 chassis. It is recommended that two Power Modules be installed for load-sharing and redundancy. Load-sharing and redundancy reduce the chance of system failure in the event of the loss of a single Power Module.

3.6   New User Interface Subsystems

The commands to exercise ASN-9000 software features are grouped into subsystems. Each *subsystem* contains commands that pertain to a particular aspect of ASN-9000 configuration or management. To display a list of the subsystems available in software version PH_FT_4.1.x on-line, issue the `subsystems` (or `ss`) command. Issue the `help` (or `?`) command to display a complete list of commands.

3.7   System Management Features

This section describes the various management features in the ASN-9000 software. The focus of this section is on management of the ASN-9000 itself, rather than configuration and management of network interfaces.

3.8   Asynchronous Transfer Mode (ATM) Protocol Support

Additional ATM protocol support for Classical IP (CLIP), CLIP Permanent Virtual Channels (CLIP PVC), FOREIP, LANE services, and RFC1483 Encapsulation Bridged and Routed has been added. These additional ATM protocols provide additional flexibility when configuring ATM connections.

3.9   Multiprocessor Optimization

Multiprocessor Optimization minimizes the latency caused in normal packet forwarding functions due to the processing of management events. By moving these processing-intensive functions to a separate MCPU, the latency of packets in the fast path can be kept to a minimum.

3.10   Multiple Boot Sources

With the new software architecture the ASN-9000 can be configured to boot from floppy disk or Flash Memory. Configuring a boot order in NVRAM ensures against failure of the primary boot source.

3.11   DOS/UNIX-Like Command-Line Interface

The ASN-9000 is managed using DOS ⁄ UNIX-like line commands. These commands are issued from a management terminal attached either directly through a TTY connection or indirectly through an in-band (TELNET) connection.

3.12   Local File-Management System

The ASN-9000 software provides global commands to display, copy, rename, and remove files stored on the Compact Flash Card. Checksums of files can be calculated, directory and volume information can be displayed, and, if necessary, the Compact Flash Card can be reformatted.

3.13   Support for Concurrent Command-Line Sessions

Four concurrent command-line management sessions can be opened simultaneously on the ASN-9000. The primary session is always the session on TTY1, but a second TTY session can be opened on TTY2. In addition, up to two TELNET sessions can also be opened.

3.14 System Configuration Files

This section describes that users can preserve configuration changes they affect through software commands by saving the changes in a ASN-9000 configuration file. If changes are saved to the `cfg` file, they are automatically applied following a software system reboot, provided the `cfg` file is present on the designated boot device.

3.15 Session Parameter Files

The ASN-9000 software provides software commands to modify parameters that control user sessions. These parameters include scroll control, TELNET control characters, command aliases, and timed commands. Changes to the defaults for these session parameters are lost when the session is closed.

Changes to session parameters can be saved in an environment file. At any time during a user session, the environment file can be read in (loaded) at any time thus reinstating the session parameter changes stored in the file.

If an environment file is saved under the filename `root.env`, it is automatically loaded whenever the system is logged into with root status. Likewise, if an environment file is saved under the filename `monitor.env`, the environment parameters in that file are automatically loaded when logging on with monitor status or the user level is changed from root to monitor during a session.

3.16 Automatic Segment-State Detection

Automatic Segment-State Detection, when enabled, automatically senses when a link (or something configured on the link) is "bad" or "down." When a "bad" or "down" link is detected on a particular port, the state of the segment is reflected in the software's interface tables. *ForeView* Network Management software allows enabling or disabling of link types on a particular port.

> **NOTE**
> To disable automatic segment state detection on a UTP port, reboot the ASN-9000 using a copy of the system software diskette that does not contain a `cfg` file or other configuration file.

3.17 Segment Statistics

The ASN-9000 software displays access method and protocol statistics related to segment and packet activity. For example, state-change statistics for individual segments can be displayed to see how many times a particular segment has gone up or down since the software was last loaded. Statistics related to the protocols are briefly described in Section 3.26.

3.18 Traffic Monitoring

The ASN-9000 software can monitor port activity at regular intervals. For example, packet activity or packet errors and collisions on a particular port can be monitored and the statistics graphed.

3.19 Virtual LANs (VLAN)

A VLAN is a collection of segments that share the same group name or protocol interface address. Bridging segments are a Layer-2 VLAN. A Layer-2 VLAN is created when a bridge group is created. The ASN-9000 software comes with a default bridge group called `default` that contains all the ASN-9000 segments.

A Layer-3 VLAN can be created by assigning the same IP, IPX, or AppleTalk interface address to multiple segments. When the ASN-9000 software determines a packet is to be sent to a Layer-3 VLAN assigned to multiple segments, the software forwards a copy of the packet on each segment. From a physical standpoint, when this happens a separate packet has been sent out to each physical interface; however, from a logical standpoint, the forwarded packet has been forwarded onto its single destination network or subnet, irrespective of how many physical interfaces that network or subnet is configured on.

3.20 Bridging and Routing Features

The **bridge** subsystem contains commands for configuring and managing the ASN-9000 system as an IEEE 802.1d bridge. Up to 32 network (bridge) groups can be defined, each containing any subset of ASN-9000 segments.

3.21 Bridge Table and Bridge Cache

The software maintains a bridge table containing the MAC-layer hardware addresses of devices to which the ASN-9000 is able to bridge packets. The software maintains the table by automatically adding new entries and deleting unused entries. In addition, individual entries, including entries to support multi-homed hosts can be added or deleted.

An example of the bridge table is shown below. Although only a handful of bridge entries are shown in this example, the bridge table usually contains many entries.

```
Bridging table (aging time = 60 minutes)
    Ethernet-address    Seg    Rule Flags
    00-00-00-00-00-00   01     none
    00-00-c0-ea-9f-17   01     none
    08-00-20-10-19-ac   08     none
    00-00-c0-ed-61-4a   01     none
    08-00-20-0c-5a-48   08     none
    02-cf-1f-90-40-23   01     none
    08-00-20-0c-3a-a2   02     none
    08-00-20-0c-5a-d2   08     none  aged
    ff-ff-ff-ff-ff-ff   --1    none  permanent bmcast
```

In addition to the bridge table, a *bridge cache* of the most recently used source-destination pairs is maintained. A *source-destination pair* contains the packet's source and destination MAC-addresses. The cache provides a fast path for the bridging software and gives an at-a-glance view of current bridging activity. The bridge cache can be displayed to show at-a-glance the source-destination pairs that are frequently being used.

3.21.1   IEEE 802.1d

The ASN-9000 can be used "right out of the box" as an IEEE 802.1d Bridge. The designation 802.1d refers to the IEEE committee number that came up with the spec for this type of bridge. For more information regarding IEEE 802.1d bridging, refer to RFCs 1493 and 1525.

3.21.2   Spanning-Tree

The ASN-9000 bridge software includes implementation of the IEEE 802.1d Spanning-Tree algorithm. When enabled, the software identifies and "breaks" loops in the network without requiring configuration changes. Commands in the **bridge** subsystem allow fine-tuning of Spanning-Tree parameters to fit the network.

3.22 IP Routing

Commands in the `ip` subsystem allow the configuring of segments for IP routing. Using `ip` commands, IP interfaces can be assigned to individual segments. The IP routing software also supports IP VLANs, enabling a single IP subnet that spans multiple segments to be defined. The following subsections describe major features of the `ip` subsystem.

3.22.1   RIP (Routing Information Protocol)

The `ip/rip` subsystem commands are available to implement standard Routing Information Protocol version 2 for exchanging TCP/IP route information with other routers. Using commands in this subsystem, RIP parameters such as talk and listen can be configured on a segment-by-segment basis. Statistics for RIP packets can also be displayed.

3.22.2   Open Shortest Path First (OSPF)

The `ip/ospf` subsystem contains commands that allow the ASN-9000 to be configured as an OSPF router. *OSPF (Open Shortest Path First)* is a routing protocol that enables each participating router to use a topological map of the network to route packets. OSPF routers exchange route information using *LSAs (link-state advertisements)*. An LSA is a packet that reports the link states (up or down) of router interfaces that are attached to devices in the OSPF network.

3.23 AppleTalk Routing

The `atalk` subsystem allows configuring ASN-9000 segments for AppleTalk Phase-2 routing. AppleTalk zones and interfaces and ping AppleTalk nodes can be defined.

3.24 IPX Routing

The ASN-9000 software allows the ASN-9000 to be configured and managed as an IPX router. In addition, the ASN-9000 software provides management information about IPX routes and servers through implementation of IPX RIP (Routing Information Protocol) and SAP (Service Advertisement Protocol). RIP or SAP talk and listen can be selectively enabled on a per-segment basis to control the flow of RIP and SAP updates in the network.

3.25 DECnet Routing

The `dec` subsystem contains commands to configure the ASN-9000 to perform DECnet Phase IV routing. Depending upon the network configuration, the ASN-9000 can be configured to function as a Level-1 or a Level-2 router. DECnet statistics for the ASN-9000 (in its capacity as a DECnet node) and for the individual segments configured as DECnet interfaces can be displayed.

3.26 Route Protocol Statistics

Statistics can be gathered and displayed for the following Internet routing protocols:

- AppleTalk
- Bridge
- DECnet
- IP
- IP/MCAST
- IPX

- OSPFv2
- RIPv2
- SNMP
- TCP
- TCP/IP

3.27 Security Filters

Filters can be defined and applied to ASN-9000 segments or protocol interfaces to control the traffic sent and received on the segments or interfaces. The following types of filters can be defined and applied:

- Bridge filters
- Host (TCP) filters
- IP filters
- IP route filters (RIP and OSPF)
- AppleTalk filters
- IPX RIP and SAP filters

4.0 Network Management Features

The ASN-9000 management environment provides comprehensive support for SNMP, as well as local RS-232 and Telnet console support. FORE Systems *ForeView* graphical network management software provides true point-and-click device configuration and runs on a variety of popular management stations.

4.1 Network Management System (NMS)

The NMS manages the ASN-9000 by sending a request to a software module, or agent, to change the value of one or more variables on the device. For example, an agent reports data such as the number of incoming and sent packets, or the number of dropped packets on that device. Then, the managed device and the NMS use Simple Network Management Protocol (SNMP) as the common protocol language to exchange the information requested by the NMS.

4.1.1 Management Information Base (MIB) Agents

MIBs contain the definitions of the resources (represented by managed objects within the MIB) that are managed by a network management system (NMS). The managed object has properties that hold values such as ASN-9000 routing table information, error counters, and so on.

4.1.2 SNMP Traps

Traps are asynchronous messages sent by an SNMP agent to the NMS. Traps can be any sort of message but usually tend to be reports of error conditions such as a network link going down. Traps provide the NMS immediate notification of extraordinary events on the network so it can respond quickly to the event. The following list describes SNMP traps available in this release.

- ATM Linkup
- ATM Linkdown
- ATM Switchover

- ATM Bootup
- ATM Fault
- Spanning Tree New Root
- Spanning Tree Topology Change
- System Power Supply Failure
- Board Failure

4.1.3 ForeView

FORE Systems *ForeView* is a graphical-based management application providing a simplified tool for managing the ASN-9000. With a point-and-click interface, *ForeView* provides access to ASN-9000 functions at both system- and segment-level. *ForeView* allows monitoring of errors, controlling the ASN-9000, bridge, and routing configuration parameters, and the ability to display, print, and save statistics.

ForeView software integrates the ASN-9000 system, bridge, and router features into a single application with access and control of all information from one location. ASN-9000 statistics are displayed in graphical formats, and the physical attributes of the managed ASN-9000, such as model and segment type, are displayed on the front panel of a graphical representation of the ASN-9000 being managed. The graphical representation is displayed when *ForeView* is started. For more information on the *ForeView* Network Management application, refer to the *ForeView Network Management User's Manual*. The following tables list the software and hardware features available in this release.

5.0 User Interface Cross-Reference

Table 3 through Table 7 were inadvertently omitted from the *ForeRunner ASN-9000 ATM Software Manual, MANU0273-01*. They are included here to assist those users who are transiting from the old user interface command structure, used in software releases 7-2.6.4.x and earlier, to the new user interface command structure, used in PH_FT_4.1.x. A similar set of tables currently exist in the *ForeRunner ASN-9000 Software Reference Manual, MANU0272-01, Appendix A*.

Table 3 - ATM Subsystem Commands

Old User Interface Command	New User Interface Command
`segment-showcfg|sscf`**`|all` Shows configuration information for Power-Cell segment(s).	`config   [show]   [s[egments]=]`*<seglist>*`|slot=`*<slot#>*`|all` Shows configuration information for PowerCell segment(s).
`ama-stats|ast` *<slot>*`|all` Displays AMA statistics.	`stats   [show]   active-ama|aa` *<slot>*`|all` Displays AMA statistics.
`ama-statsclear|astc` *<slot>*`|all` Clears AMA statistics.	`stats clear active-ama|aa` *<slot>*`|all` Clears AMA statistics.
`ama-show-linemode|aslm` *<slot>*`|all` Display AMA line mode.	`active-ama|aa [show] [linemode|lm]` *<slot>*`|all` Display AMA line mode.
`ama-linemode-set|alse` *<slot> <mode>* Sets AMA line mode.	`active-ama|aa   cset   linemode|lm` *<mode> <slot>* **Sets AMA line mode.**

Table 3 - ATM Subsystem Commands

Old User Interface Command	New User Interface Command

`ama-set|ase` *<slot>*`|all` *<param> <value>*
Selects which AMA card to be used as primary or backup.
	`active-ama|aa` `cset`
	`p[rimary]|b[ackup]` *<slot>*`|all`
	Selects which AMA card to be used as primary or backup.

`ama-showcfg|ascf` *<slot>*`|all` Shows AMA configuration.	`aa show` Shows AMA configuration.

`segment-set|sse` *<seg-list>*`|all` *<param>*
<value> `[`*<param> <value>*`]`
Specifies the protocol to be used.
	`sset proto[col]` *<proto> <seglist>*`|all`
	<proto> `= l[ane] | c[lassical-ip] |`
	`b[ridge-encap] | f[ore-ip]`
	Specifies the protocol to be used.

`segment-set|sse` *<seg-list>*`|all` *<param>* *<value>* `[`*<param> <value>*`]` Associates a segment to a rate group.	`sset rate-group|rg 1|2|3|4` *<seg-* *ment>*`|all` Associates a segment to a rate group.
`rate-set|rse` *<slot> <rate-group> <rate>* Configures the rate group to a given rate.	`rate-group|rg cset` *<rate-group> <rate>* *<slot>* Configures the rate group to a given rate.
`rate-showcfg|rscf` *<slot>*`|all` Shows rate group information.	`rate-group|rg [show]` *<slot>*`|all` Shows rate group information.
`atm-vc-show|avc` **`|all` Displays all VCs which are active on specified ATM segment(s).	`vc [show]` *<seglist>*`|all` Displays all VCs which are active on specified ATM segment(s).

Table 4 - ATM/1483ENCAP Subsystem Commands

Old User Interface Command	New User Interface Command
`br-encap-showcfg|bscf` ** Display RFC-1483 encapsulation statistics and other related information.	`config [show]` *<seglist>*`|all` Display RFC-1483 encapsulation statistics and other related information.
`br-encap-set|bse` ** `[`*<param>* *<value>*`...]]` *<state> <enl>* Enables virtual channels.	`senable` *<seglist>* Enables virtual channels.
`br-encap-set|bse` ** `[`*<param>* *<value>*`...]]` *<state> <dis>* Disables virtual channels.	`sdisable` *<seglist>* Disables virtual channels.
`br-encap-set|bse` ** `[`*<param>* *<value>*`...]]` *<state> <dis>* Sets up incoming virtual channel ID.	`inpvc sset` *<vci> <seglist>* Sets up incoming virtual channel ID.
`br-encap-set|bse` ** `[`*<param>* *<value>*`...]]` *<state> <dis>* Sets up outgoing virtual channel ID.	`outpvc sset` *<vci> <seglist>* Sets up outgoing virtual channel ID.

Table 5 - ATM/LANE Subsystem Commands

Old User Interface Command	New User Interface Command
`lec-showcfg|lscf` *<slot>*`|all` Displays LEC configuration information for the PowerCell module.	`lec [show]` *<slot>*`|all` Shows configurations of LEC associated to the specified slot(s)
`elan-showcfg|escf` *<elan-name>*`|all` Shows configurations of ELANs specified.	`elan [show]` *<elan-name>*`|all` Shows configurations of ELAN.
`elan-arptable|eat` *<elan-name>*`|`*<mac-address>*`|all` Shows LE ARP table entries which map MAC addresses to ATM addresses of a given ELAN or MAC address.	`at [show] elan=<`*elan-name*`>|addr=<`*mac-address*`>|all` Shows LE ARP table entries which map MAC addresses to ATM addresses of a given ELAN or MAC address.
`elan-arptableclear|eatc` *<elan-name>*`|all` Clears LE ARP table entries of ELANs specified.	`at clear` *<elan-name>*`|all` Clears LE ARP table entries of ELANs specified.
`elan-vctable|evt` *<elan-name>*`|all` Shows what VCs are being used on a specified ELAN.	`vt [show]` *<elan-name>*`|all` Shows what VCs are being used on a specified ELAN.
`bus-add|buadd` *<elan-name>* *<slot>* *<bus-SELbyte>* `[rate-group]` Add a BUS *<elan-name>* to slot *<slot>* on Selector byte *<bus-SELbyte>* with packet forwarding out rate group [rate-group].	`bus add <`*bus-elan-name*`> <`*slot*`> <`*bus-SELbyte*`> [[rg=]<`*rate-group*`>] [-type (ethernet | token-ring)] [-mtu (1516 | 4544 | 9234)]` Add a BUS *<elan-name>* to the specified slot with selector byte. *<bus-SELbyte>* must be specified in hexidecimal. The *<rate-group>* defaults to 1.
`bus-del|budel` *<elan-name>* *<slot>* Delete BUS *<elan-name>* from slot *<slot>*.	`bus delete` *<bus-elan-name>* *<slot>* Delete BUS *<elan-name>* from slot *<slot>*.
`bus-stats|bust` *<elan-name>*`|all` *<slot>*`|all` Display statistics for specified BUSs on specified slots.	`stats [show] bus` *<service-name>*`|all` *<slot>*`|all` Display statistics for specified BUSs on specified slots.
`bus-statsclear|bustc` *<bus-elan-name>*`|all` *<slot>*`|all` Clear statistics for specified BUSs on specified slots.	`stats clear bus` *<service-name>*`|all` *<slot>*`|all` Clear statistics for specified BUSs on specified slots.

Table 5 - ATM/LANE Subsystem Commands

Old User Interface Command	New User Interface Command
`les-add|leadd` *<elan-name>* *<les-SELbyte>* *<bus-SELbyte>* **[rate-group]**|*<bus-atm-address>* Add an LES *<elan-name>* on slot *<slot>* with Selector byte *<les-SELbyte>.*	`les add` *<les-elan-name>* *<slot>* *<Service-ID>* **[[rg=]**<rate-group>**][-type (ethernet | token-ring)] [-mtu (1516 | 4544 | 9234)]** Add an LES *<elan-name>* on slot *<slot>* with Selector byte *<les-SELbyte>.* The associated BUS is specified by either the selector byte, *<bus-SELbyte>,* or by specifying the full ATM address, *<bus-atm-address>.* If *<bus-SELbyte>* is used both the LES and BUS are created and are co-located. *<les-SELbyte>* and *<bus-SELbyte>* must be specified in hexidecimal. The second usage requires the specification of an 8-digit Service Identifier (decimal notation or prefix with a "0x" for hex. notation). This ID will be used to construct an ATM address where the service can be located independent of the physical topology. Both the LES and BUS are created under this usage. The *<rate-group>* defaults to 1.
`les-del|ledel` *<elan-name>* *<slot>* Delete LES *<elan-name>* on slot *<slot>.*	`les delete` *<les-elan-name>* *<slot>* Delete LES *<elan-name>* on slot *<slot>.*
`les-stats|lest` *<elan-name>*|`all` *<slot>*|`all` Display statistics for specified LESs on specified slots.	`stats [show] les` *<service-name>*|`all` *<slot>*|`all` Display statistics for specified LESs on specified slots.
`les-statsclear|lestc` *<elan-name>*|`all` *<slot>*|`all` Clear statistics for specified LESs on specified slots.	`stats clear les` *<service-name>*|`all` *<slot>*|`all` Clear statistics for specified LESs on specified slots.
`les-showmember|lesm` *<elan-name>*|`all` *<slot>*|`all` Display MAC to ATM address mappings for specified LESs on specified slots.	`stats [show] member|lesm` *<service-name>*|`all` *<slot>*|`all` Display MAC to ATM address mappings for specified LESs on specified slots.
`elan-add|eadd` *<elan-name>* ** **[**<les-atm-address>**]** Associates an ELAN to a segment with an optional LES ATM address.	`elan add` ** *<elan-name>* **[la** <les-atm-address> **| lu** <lecs-atm-address>**]** Associates an ELAN to segment with an optional LES ATM address or LECS ATM ADDRESS.
`elan-del|edel` *<elan-name>* Deletes any ELAN to segment association of a given ELAN.	`elan delete` *<elan-name>* Deletes any ELAN to segment association of a given ELAN.

Table 5 - ATM/LANE Subsystem Commands

Old User Interface Command	New User Interface Command
`elan-stats|est <elan-name>|all elan|if|all` Shows ELAN specific (elan) or Interface specific (if) statistics of the ELANs specified.	`stats [show] elan <elan-name>|all elan|if|all` Shows ELAN specific (elan) or Interface specific (if) statistics of the ELANs specified.
`elan-statsclear|estc <elan-name>|all` Clears statistics of the ELANS specified.	`stats clear elan <elan-name>|all` Clears statistics of the ELANS specified.

`elan-set|ese <elan-name>|all <param> <value>`
`[<param><value>.[<param><value>]]`
Configures an ELAN.
	`elan set <elan-name>|all arp-aging|aa <time>`
	Configures the maximum time that the specified ELAN will maintain an entry in its ARP cache in the absence of a verification of that relationship. Min: 10 sec, Max: 300 sec, Default: 10 sec.

`elan-set|ese <elan-name>|all <param> <value>`
`[<param><value>..[<param><value>]]`
Configures an ELAN.
	`elan set <elan-name>|all bus-rate|br <packets per second>`
	Defines how many unknown packets per second the specified ELAN may send to the BUS. Min: 0 pps , Max: 10 pps , Default: 1 pps.

`elan-set|ese <elan-name>|all <param> <value>`
`[<param><value>..[<param><value>]]`
Configures an ELAN.
	`elan set <elan-name>|all control-timeout|cto <time>`
	Configures the time out period used for timing out request/response control frame interactions of the specified ELAN Min: 10 sec, Max: 600 sec, Default: 120 sec.

`elan-set|ese <elan-name>|all <param> <value>`
`[<param><value>..[<param><value>]]`
Configures an ELAN.
	`elan set <elan-name>|all flush-timeout|fto <time>`
	Configures the time limit to wait for receiving an LE_FLUSH_RESPONSE after an LE_FLUSH_REQUEST has been sent. Min: 1 sec , Max: 6 sec, Default: 6 sec.

`elan-set|ese <elan-name>|all <param> <value>`
`[<param><value>..[<param><value>]]`
Configures an ELAN.
	`elan set <elan-name>|all forward-delay|fd <time>`
	Configures the maximum time that the specified ELAN will maintain an entry in its ARP cache in the absence of a verification of that relationship, as long as Topology Change is true. Min: 4 sec, Max: 30 sec, Default: 15 sec.

`elan-set|ese <elan-name>|all <param> <value>`
`[<param><value>..[<param><value>]]`
Configures an ELAN.
	`elan set <elan-name>|all max-arp-retry|mar <count>`
	Defines the number of times the specified ELAN may send LE_ARP_REQUEST for a given frame's LAN destination. Min: 0, Max: 2, Default: 1

Table 5 - ATM/LANE Subsystem Commands

Old User Interface Command	New User Interface Command
`elan-set|ese` *<elan-name>*`|all` *<param>* *<value>* `[<param><value>..[<param><value>]]` Configures an ELAN.	`elan set` *<elan-name>*`|all vcc-time-out|vto` *<time>* Configures the time out period used to release Data Direct VCC which has been idle for this amount of time. Min: 1 min, Max: 720 min (12 hours) , Default: 20 min.
`lec-set|lse lu` *<lecs-atm-addr>* Configures the LEC. If*<lecs-atm-addr>* is specified, the user configured LECS address is used.	`lec cset lecs-addr` *<lecs-atm-address> <slot>*`|all` Configures the specified LECS to be used by the LEC of the specified slot. where <lecs-atm-address> is either valid atm address or "wka" which stands for well-known LECS ATM address.
`lec-set|lse lu enl|dis` Enables or Disables the use of LECS by the LE Client of the specified slot.	
`lec-set|lse state enl|dis` Starts or stops the LE Client of the specified slot.	
`service-show|sescf` *<elan-name>*`|all` *<slot>*`|all [les|bus]` Shows service configuration on specified slot.	
`elan-configure|elco` *<elan-name>* ** *<param><value>* `[`*<param><value>..*`[`*<param><value>*`]]` Enables/disables LE Client on specified ELAN and segment	

Table 6 - ATM/FOREIP Subsystem Commands

Old User Interface Command	New User Interface Command
`foreip-statistics|fst` ** Display FORE-IP protocol statistics associated with **.	`stats [show]` *<seglist>* Display FORE-IP protocol statistics associated with segment(s).
`foreip-stats-clear|fstc` ** Clears FORE-IP statistics for the specified **.	`stats clear` *<seglist>* Clears FORE-IP statistics for the specified segment(s).
`foreip-set|fse` * <param> <value>* This command enable/disable FORE-IP protocol on the specified segment, only if the segment is not operating in that mode currently.	`senable` *<seglist>* Enables the use of FOREIP on the specified segment(s).

Table 6 - ATM/FOREIP Subsystem Commands

Old User Interface Command	New User Interface Command
`foreip-set│fse` * <param> <value>* This command will enable/disable FORE-IP protocol on the specified segment, only if the segment is not operating in that mode currently.	`sdisable` *<seglist>* Disables the use of FOREIP on the specified segment(s).
`foreip-show-cache│fsoc` ** Display FORE-IP cache associated with **.	`cache [show]` *<seglist>* Sets up incoming virtual channel ID on specified segment(s).

Table 7 - ATM/CLIP Subsystem Commands

Old User Interface Command	New User Interface Command
`clip-set│clse state enl` * <param> <value>* `[` *<param> <value>*`...]]` Enables or disables classical IP on the specified segment.	`senable` *<seglist>* Enables the use of CLIP on the specified segment(s).
`clip-set│clse state dis` * <param> <value>* `[` *<param> <value>*`...]]` Enables or disables classical IP on the specified segment.	`sdisable` *<seglist>* Disables the use of CLIP on the specified segment(s).
`clip-set│clse as` * <param> <value>* `[` *<param> <value>*`...]]` Specifies the 20 byte ATM address of the ATM ARP server.	`atmarp-addr│as sset` *<arpsvr-atm-addr> <seglist>* Specifies the 20 byte ATM address of the ATM ARP server.
`clip-set│clse aa` * <param> <value>* `[` *<param> <value>*`...]]` Configures the maximum time that an ATM ARP entry is kept without being used.	`arp-aging│aa sset` *<seconds> <seglist>* Configures the maximum time that an ATM ARP entry is kept without being used. Min: 10 sec, Max: 600 sec, Def: 300 sec.
`clip-set│clse at` * <param> <value>* `[` *<param> <value>*`...]]` Time to wait when connecting to an ARP server to detect that the attempt failed.	`arp-conn-timeout│at sset` *<seconds> <seglist>* Time to wait when connecting to an ARP server to detect that the attempt failed. System will attempt to reconnect. Min: 5 sec, Max: 60 sec, Def: 10 sec.
`clip-showcfg│clsh` **`│all [-l]` Shows the classical IP configuration for the requested segment(s).	`config [show] [local│l]` *<seglist>*`│all` Shows the classical IP configuration for the requested segment(s). If "local" or "l" is specified, locally stored information on the packet engine will be displayed.
`clip-stats│clst` **`│all` Shows the classical IP packet statistics for the requested segment(s).	`stats [show]` *<seglist>*`│all` Shows the classical IP packet statistics for the requested segment(s).

Table 7 - ATM/CLIP Subsystem Commands

Old User Interface Command	New User Interface Command
`clip-stats-clear|clsc` **`|all` Clear the classical IP packet statistics for the requested segment(s).	`stats clear <`*seglist*`>|all` Clear the classical IP packet statistics for the requested segment(s).
`clip-arp-tbl|clat` **`|all` *<ipaddr>*`|all` Shows ATM ARP table entry(ies) which map IP addresses to ATM address for the requested ATM segment(s).	`arp [show] <`*ipaddr*`>|all <`*seg-list*`>|all` Shows ATM ARP table entries which map IP addresses to ATM addresses for the requested ATM segment(s), This table also contains the mapping to the associated virtual circuit.
`clip-arp-tbl-clear|clac seg-ment|all` Clears the ATM ARP table entries for the requested ATM segment(s).	`arp clear <`*seglist*`>|all` Clears the ATM ARP table entries for the requested ATM segment(s).

6.0   Known Problems

The following known problems exist in software version FT_4.1.x for the ForeRunner ASN-9000:

1. No command similar to RIP CONTROL TYPE available in PH_FT4.1.x user interface.

2. When OSPF is used to do One-Arm-Routing between FOREIP and LANE, even though routes look updated when displaying the routing tables, connectivity can not be established between the end systems through the One-Arm-Router.

7.0 Contacting Technical Support

In the U.S.A., contact FORE Systems' Technical Support by any one of four following methods:

1. If access to the Internet is available, contact FORE Systems' Technical Support via e-mail at the following address:

    support@fore.com

2. FAX questions to "support" at:

    724-742-7900

3. Mail questions, via U.S. Mail, to the following address:

    FORE Systems, Inc.
    1000 FORE Drive
    Warrendale, PA 15086-7502

4. Telephone questions to "support" at:

    800-671-FORE (3673)
    or
    724-742-6999

Technical support for non-U.S.A. customers should be handled through the local FORE Systems distributor.

No matter which method is used for technical support, please be prepared to provide the serial number(s) of the product(s) and as much information as possible describing the problem or question.